SPAM CLASSIFIER
810021106713:A.R.DHARSHINI
PHASE 2

INTRODUCTION TO EMAIL SPAM:

We all know that billions of spam are sent every day to user email accounts and more than 90% of these spam emails are malicious and cause major harm to the user.

PREREQUISITES:

First, we'll import the necessary dependencies. Pandas is a library mostly used by data scientists for data cleaning and analysis.

Scikit-learn, also called Sklearn, is a robust library for machine learning in Python. It provides a selection of efficient tools for machine learning and statistical modelling, including classification, regression, clustering, and dimensionality reduction via a consistent interface.

Run the command below to import the necessary dependencies:

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import CountVectorizer
from sklearn import svm
```

GETTING STARTED :

To get started, first, run the code below:

spam = pd.read_csv('spam.csv')

In the code above, we created a spam.csv file, which we'll turn into a data frame and save to our folder spam. A data frame is a structure that aligns data in a tabular fashion in rows and columns, like the one seen in the following image.

Go ahead and download the sample .csv file from GitHub. It mimics the layout of a typical email inbox and includes over 5,000 examples that we'll use to train our model.

PYTHON :train_test_split()

We'll use a train-test split method to train our email spam detector to recognize and categorize spam emails. The train-test split is a technique for evaluating the performance of a machine learning algorithm. We can use it for either classification or regression of any supervised learning algorithm.

The procedure involves taking a dataset and dividing it into two separate datasets. The first dataset is used to fit the model and is referred to as the training dataset. For the second dataset, the test dataset, we provide the input element to the model. Finally, we make predictions, comparing them against the actual output.

- Train dataset: used to fit the machine learning model.
- Test dataset: used to evaluate the fit of the machine learning model.

In practice, we'd fit the model on available data with known inputs and outputs. Then, we'd make predictions based on new examples for which we don't have the expected output or target values. We'll take the data from our sample .csv file, which contains examples pre-classified into spam and non-spam, using the labels spam and ham, respectively.

To split the data into our two datasets, we'll use scikit-learn's **train_test_split()** method.

Let's say we have 100 records in the loaded dataset. If we specify the test dataset is 30 percent, we'll split 70 records for training and use the remaining 30 records for testing.

RUN THE COMMAND BELOW:

```
z = spam['EmailText']
y = spam["Label"]
z_train, z_test,y_train, y_test = train_test_split(z,y,test_size = 0.2)
```

z = spam['EmailText'] assigns the column EmailText from spam to z. It contains the data that we'll run through the model.

y = spam["Label"] assigns the column Label from spam to y, telling the model to correct the answer. You can see a screenshot of the raw dataset below.

The function z_train, z_test,y_train, y_test = train_test_split(z,y,test_size = 0.2) divides columns z and y into z_train for training inputs, y_train for training labels, z_test for testing inputs, and y_test for testing labels.

test_size=0.2 sets the testing set to 20 percent of z and y.

EXTRACTING FEATURES:

Next, we'll run the code below:
cv = CountVectorizer()

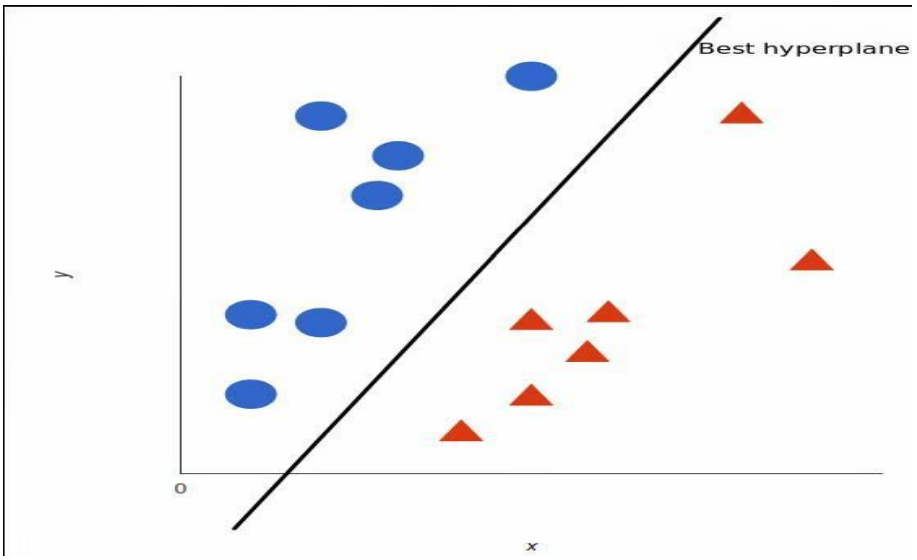
features = cv.fit_transform(z_train)
In cv= CountVectorizer(),

CountVectorizer() randomly assigns a number to each word in a process called tokenizing. Then, it counts the number of occurrences of words and saves it to cv. At this point, we've only assigned a method to cv.

features = cv.fit_transform(z_train) randomly assigns a number to each word. It counts the number of occurrences of each word, then saves it to cv. In the image below, 0 represents the index of the email.

BUILDING THE MODEL:

SVM, the support vector machine algorithm, is a linear model for classification and regression. The idea of SVM is simple, the algorithm creates a line, or a hyperplane, which separates the data into classes. SVM can solve both linear and non-linear problems:



Let's create an SVM model with the code below:

model = svm.SVC()

model.fit(features,y_train)

model = svm.SVC() assigns svm.**SVC()** to the model.

In the model.fit(features,y_train) function, model.fit trains the model with features and **y_train.** Then, it checks the prediction against the **y_train** label and adjusts its parameters until it reaches the highest possible accuracy.

TESTING OUR EMAIL SPAM DETECTOR:

Now, to ensure accuracy, let's test our application. Run the code below:
features_test = cv.transform(z_test)
print("Accuracy: {}".format(model.score(features _test,y_test)))

The features_test = cv.transform(z_test) function makes predictions from z_test that will go through count vectorization. It saves the results to the features_test file.
In the print(model.score(features_test,y_test)) function, mode.score() scores the prediction of features_test against the actual labels in y_test.

The full script for this project is below:.

```
Import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import CountVectorizer
from sklearn import svm

spam = pd.read_csv('C:\\Users\\nethm\\Downloads\\spam.csv')
z = spam['EmailText']
y = spam["Label"]
z_train, z_test,y_train, y_test = train_test_split(z,y,test_size = 0.2)

cv = CountVectorizer()
features = cv.fit_transform(z_train)

model = svm.SVC()
model.fit(features,y_train)model = svm.SVC()
model.fit(features,y_train)

features_test = cv.transform(z_test)
print(model.score(features_test,y_test))
```